

What is Claimed is:

1. An isolated 16S rDNA sequence indicative of a dechlorinating bacterial strain selected from the group consisting of:

- (a) SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NO:30, and SEQ ID NO:34;
- (b) an isolated nucleic acid molecule that hybridizes with (a) under the following hybridization conditions: 0.1X SSC, 0.1% SDS at 65°C; and
- (c) an isolated nucleic acid molecule that is completely complementary to (a) or (b).

2. An isolated 16S rDNA sequence indicative of a dechlorinating bacterial strain selected from the group consisting of:

- (a) SEQ ID NOs:9-29 and SEQ ID NOs:35-60;
- (b) an isolated nucleic acid molecule that hybridizes with (a) under the following hybridization conditions: 0.1X SSC, 0.1% SDS at 65°C; and
- (c) an isolated nucleic acid molecule that is completely complementary to (a) or (b).

3. An isolated 16S rDNA sequence of Claim 1 wherein within the 16S DNA sequence the following bases, taken independently or together are:

base E107=G, base E184=G, base E190=C, E 198=T, E201= T, E208=C, E217=T, E222=C, E264=C, E267=C, E291=T, E333=C, E420=C, E444=T, E631=A, E829=A, E933=T, E934=T, E980=C, E1003=T, E1012=T, E1020=G, E1039=A, E1040=C, E1087=T, E1114=C, E1284=T, E1364=T and E1427=A.

4. An isolated 16S rDNA sequence indicative of a dechlorinating bacterial strain as set forth in SEQ ID NO:1.

5. An isolated bacterial strain comprising any one of the sequences of Claims 1, 3 or 4 wherein said strain has the ability to dechlorinate chlorinated compounds.

6. A method for identifying a dechlorinating bacterial strain comprising:

- (i) extracting genomic DNA from a cell suspected of being able to dechlorinate chlorinated compounds;
- (ii) probing the extracted genomic DNA with a probe derived from any one of the sequences of Claims 1, 2, 3 or 4 under suitable hybridization conditions;

wherein the identification of a hybridizable nucleic acid fragment confirms the presence of a bacteria capable of dechlorinating chlorinated compounds.

7. A method according to Claim 6 wherein the probe corresponds to a portion of any one of the sequences selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NOs:9-29, SEQ ID NO:30, SEQ ID NO:34, and SEQ ID NOs:35-60.

5 8. A method according to Claim 7 wherein the probe contains at replication inhibiting moiety at the 3' end.

9. A method of Claim 8 wherein the replication inhibiting moiety is selected from the group consisting of dideoxynucleotides, a sequence of mismatched nucleotides, 3' phosphate, a molecular spacer, and 3' deoxynucleotides.

10 10. The method of Claim 9 where in the 3' deoxynucleotide is cordycepin.

11. A method for identifying a dechlorinating bacterial strain comprising:

(i) extracting genomic DNA from a cell suspected of being able to dechlorinate chlorinated compounds; and

(ii) amplifying the extracted genomic DNA with at least one oligonucleotide primer corresponding to a portion of any one of the sequences of Claims 1, 2, 3 or 4 such that amplification products are generated;

15 wherein the presence of amplification products confirms the presence of a bacteria capable of dechlorinating chlorinated compounds.

20 12. A method according to Claim 11 wherein the oligonucleotide primer corresponds to a portion of any one of the sequences selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NOs:9-29, SEQ ID NO:30, SEQ ID NO:34, and SEQ ID NOs:35-60.

25 13. A method for the dechlorination of chlorinated compounds comprising contacting a chlorinated compound with the isolated bacterial strain of Claim 5 under conditions for the dechlorination to occur.

30 14. A method according to Claim 13 wherein said dechlorinating compound is selected from the group consisting of carbontetrachloride, tetrachloroethene, chloroform, dichloromethane, trichloroethene, dichloroethylene, vinyl chloride, and chloroaromatics.